Chapter 2
Multi-Modal Networks

Modes and networks are key terms in transportation planning. Modes are the methods of travel—by auto, transit, plane, bicycle, or foot, while networks refer to the infrastructure on which this travel occurs. Roads, rails, trails, sidewalks, bus routes, and flight zones are all key components of the overall transportation network. This chapter describes the County's plan for transit, ridesharing and non-motorized components of the system. Carpooling, while technically not an example of transit, does help to reduce travel by private automobile and is thus included in this chapter as well. Transit and carpooling are further supported by park-and-ride facilities, employer outreach programs, and other travel demand management techniques. For the purposes of this chapter, non-motorized travel includes walking and biking. While often recognized as recreational activities, with adequate infrastructure in place, such as sidewalks and bike lanes, they can also take the form of travel for transportation purposes, removing unnecessary trips from the County's roads. The County's road network policies are presented in Chapter Three.

Increasing travel demand on the County's highways has created the need to plan multi- and inter-modal networks as well as single-mode networks. In areas of substantial development, current and forecasted levels of congestion have shown that the highway network, even with improvements, may not be able to serve travel needs adequately. In 1990, four percent of peak period (rush-hour) travel on the County's arterial roads was done under congested conditions (Level of Service "F" or "G"). By 2020, even with all regional and local projects in the metropolitan area's Constrained Long-Range Plan (CLRP) in place, travel conditions during peak periods are expected to worsen to levels such that 33 percent of travel on these same roads will be under congested conditions.[1] Fifteen percent of peak period travel on the County's freeways will be at a LOS "F" or "G" by 2020.[2] In response, the County has planned improved opportunities for transit use, ridesharing, bicycling, and walking to complement auto travel and allow the road network to maintain adequate levels of service. In addition, the typical section of Route 28 has been increased to eight lanes.

The measures outlined in this *Revised Countywide Transportation Plan* for enhanced transit and non-motorized means of travel are consistent with the County's Smart Growth principles. Travel by transit, carpool, or bicycle reduces the total number of miles traveled by private auto, resulting in reduced vehicle emissions and energy use and improved overall air quality.

Water quality benefits are accrued from reduced auto travel. Air pollution leads to atmospheric deposition (acid rain), a significant polluter of the Chesapeake Bay. Metal contaminants such as lead, copper, and nickel released in auto emissions and tire breakdown are added to the runoff of oils, fuels, coolants, transmission fluids, and road salts, all of which contaminate streams and other water bodies. Increased impervious surface area from roads and parking lots alters the natural flow of water resulting in heavier flow during storm events and leads to increased stream erosion and sedimentation. Erosion causes streams to become wider and shallower during normal flow, altering water temperature and thus changing stream habitat.

[1] The Constrained Long-Range Plan or CLRP is prepared by the National Capital Region Transportation Planning Board—the federally designated metropolitan planning organization for the Washington, D.C., Metropolitan Area. It identifies the capital improvements, studies, actions, and strategies that the region proposes by the year 2020. Since 1993, federal law has required that the plan be financially constrained to only those projects that have an identifiable projected revenue that can be "reasonably expected to be available."

[2] Northern Virginia Transportation Coordinating Council, *Northern Virginia 2020 Transportation Plan*, December 1999.

Alternative transportation measures also support the County's goal of creating walkable, mixed-use communities because they help to reduce the need to build multi-lane roadways. They serve the mobility needs of a growing population, helping to attract employers to the County. A balanced transportation system helps to ensure that those individuals who cannot or choose not to drive are still afforded viable travel options.

Air Transportation

The Washington Dulles International Airport and the Leesburg Executive Airport are both important components of the multi-modal transportation system serving Loudoun County and the surrounding region. Air travel has grown tremendously in the past decade and is expected to continue its expansion. In fact, the Metropolitan Washington Airports Authority (MWAA) forecasts that enplanements (boardings) at Dulles Airport are expected to grow 54.7 percent between 2000 and 2009.[3] The *Revised General Plan* notes, "the County supports the continued growth and expansion of the Washington Dulles International Airport and will ensure that provision is made for land use and county infrastructure consistent with that expansion." Both airports are to be supported with a surface transportation system that will provide for the safe, convenient, environmentally-sound and cost-effective movement of passengers and cargo. Dulles Airport is scheduled to be served by expanded express bus service by 2005 and rail transit service by 2010.

Public Transit and Ridesharing

Transit, also known as public transportation, can take many forms. It includes rail transit, such as Washington D.C.'s Metrorail service, as well as bus service. Many forms of bus service exist. In Loudoun, residents can take a commuter bus to Washington, D.C., board one of Leesburg's fixed-route buses, or call for a ride on one of two demand responsive buses serving the rural area. The County is also studying express bus service along the Dulles Greenway corridor.

The County will plan and implement the development of efficient public transportation and ridesharing opportunities serving all four suburban communities identified in the *Revised General Plan* as well as continue to support demand responsive service in the Rural and Transition Policy areas. In recognition that many trips continue beyond County borders, the County will coordinate its networks with neighboring jurisdictions and the region so that seamless travel opportunities are in place. System facilities such as bus stops and park-and-ride lots will be conveniently located and will have adequate lighting and landscaping to ensure the security of users and consistency with the community design objectives of the *Revised General Plan*. All facilities will meet the needs of the entire population, including persons with disabilities.

A. Transit and Land Use

A number of land use attributes that enhance quality of life and support transit use include:

- A compact urban form,
- An increase in the number of residents and employees within a 1/4 mile radius of a transit stop,
- A richness of the land use mix in transit corridors,
- The pleasantness of the environment for pedestrians and bicyclists, and,
- A comparable or lower cost of transit versus driving, including parking costs.

[3] Metropolitan Washington Airports Authority, Multiyear Forecast 2000-2009. June 2000.

Of these attributes, compact residential and employment densities are the single most important factor associated with transit use.[4] The greater the number of people near a transit system, the greater the potential ridership on that system (see Table 2-1, pg. 2-3). While ridership is dependent on a variety of different conditions, a review of national and inter-national research sponsored by the Federal Transit Administration (FTA) suggests minimum levels of transit service appropriate for various residential land use densities.

Typically, five to eight million square feet of commercial/office space can support minimum bus service (1 bus/hour) while 35–50 million square feet of commercial/office space would be needed to support light rail or feeder bus service.[5] Higher concentrations of employees would be necessary for viable rapid rail service (i.e., Metrorail).

Table 2-1: Relationship Between Residential Densities And Different Types of Transit Services[6]

Boris Pushkarev and Jeffrey Zupan (1982) recommend the following densities			
Service Levels			**Density Thresholds**
Bus: minimum service	½ mile between routes	20 buses/day	4 du/acre
Bus: intermediate service	½ mile between routes	40 buses/day	7 du/acre
Bus: frequent service	½ mile between routes	120 buses/day	15 du/acre
Light Rail:	25-100 sq-mile corridor	5-minute peak headways	9 du/acre
Rapid rail (Metrorail):	100-150 sq-mile corridor	5-minute peak headways	12 du/acre
Commuter rail (VRE):	Existing track	20 trains/day	1-2 du/acre

Pedestrian-friendly, mixed-use development that combines residential, retail, and office uses helps to provide a continuous two-way flow of riders throughout the day. Mixed-use development has been shown to reduce the need for the car by 18 to 25 percent when some trips, such as lunchtime errands, can be accomplished on foot or by bicycle. The need for parking construction can be reduced by creating shared parking opportunities.[6]

Because of the strong linkage between land use and transit and the life span of residential and commercial development, the County will seek transit-supportive development in the transit corridors. Currently, these corridors are the Dulles Greenway, Routes 7, 28 and US 50 in the Suburban Policy Area. Interim uses that do not provide densities sufficient for transit service will be discouraged. Attention will be given to a coordinated land use and transportation strategy during the Community Plan process to more fully establish the density, use mix, and urban design characteristics of each of these transit corridors. Corridor designations may be revised based on the results of the Countywide Public Transportation Study underway in 2001.

Residential and nonresidential densities in transit nodes are dependent on the transit service available and may reach density levels as high as 50 dwelling units per acre and a floor area ratio (FAR) of 2.0 when rapid rail transit service is in place. Outside the Dulles Greenway corridor, high density residential neighborhoods may be built at densities of 16 dwelling units per acre. The *Revised General Plan* also

[4] Transportation Research Board, National Research Council, Transit and Urban Form, Transit Cooperative Research Program Report 16, Volume 1, 1996.
[5] Ibid
[6] Ibid

outlines design parameters to help the Suburban Policy Area succeed in becoming a walkable, mixed-use community.

B. Dulles Corridor Bus and Rail

The planned Dulles Corridor Rapid Transit Project, currently in the last study phase of the National Environmental Policy Act (NEPA) process, is one of the County's and Region's priority transportation projects. Once completed, this system will bring rail transit service to Loudoun County with stops at Dulles Airport and at transit nodes in the vicinity of Route 606 and Route 772 along the Dulles Greenway. A Major Investment Study (MIS) on the project recommends extending Metrorail from the West Falls Church station through Tysons Corner and Reston along the Dulles Airport Access Road and into Loudoun County. This project has been incorporated in the regional CLRP endorsed by the National Capital Region Transportation Planning Board (TPB).

Initially, the Dulles Greenway corridor will be served by a Bus Rapid Transit (BRT) system. BRT combines the features of conventional buses and a rapid transit system, such as Metrorail. For example, BRT in the Dulles Greenway corridor will use platform-level boarding buses, and fares will be collected before passengers board. Passenger information systems will also provide data, such as bus arrival times, to improve service. The buses will stop at dedicated stations along the Dulles Airport Access Road and the Dulles Greenway. These improvements will make it easier and faster to travel in the corridor. The County will encourage the provision of transit services that link the Dulles Greenway corridor with other areas of the County. The Loudoun County Parkway may also be served by future feeder bus services.

In April 2000, the FTA, Virginia Department of Rail and Public Transportation (DRPT), and Washington Metropolitan Area Transit Authority (WMATA) began preparing an Environmental Impact Statement (EIS) on the BRT/Rail project and evaluating preliminary alternatives in accordance with the federally-required NEPA process. The EIS and preliminary engineering for BRT and rail is scheduled for completion by 2002. The BRT phase of the project is expected to be implemented in Loudoun County in the 2003/2004 timeframe with a conversion to rail service by 2010. This project is considered particularly important for the County's transportation system as it provides important surface transportation links to Dulles Airport and offers convenient commuting opportunities for County residents as well as employees who travel from neighboring jurisdictions to employment centers in the Dulles Greenway corridor.

Without this project, congestion levels on all three major roadway connections to Fairfax County and the Region's core may reach intolerable levels, leading to serious impacts on the economic health of the County. Moreover, by 2020, the region will need this project in order to stay within its emissions budget and satisfy the requirements of the Clean Air Act. The County has demonstrated its strong commitment to the project through the identification of a local funding match in the adopted Capital Improvement Program. This match will be pooled with dedicated state and federal funds.

C. Rideshare Program

The purpose of the Loudoun County Rideshare Program (LCRP), is to reduce traffic by increasing the use of high occupancy vehicles (HOVs). The LCRP manages the commuter bus system, assists with the formation of car and vanpools, and provides adequate park and ride facilities for all commuters where possible. In addition, the LCRP assists major employers through outreach and the dissemination of public information materials designed to encourage the use of HOVs. The LCRP promotes commuter services through TV and print advertising, community events, and local organizations. As part of the rideshare program, Loudoun County has operated a growing commuter bus service since 1993. Since 1995, annual ridership has quadrupled to 172,923 one-way passenger trips, removing from the region's road network more than 6.9 million miles of private passenger automobile travel. In addition to serving the existing needs of County residents, commuter buses can function as precursors to other more capital intensive forms of

transit such as light and rapid rail service. A fuller discussion of the rideshare program can be found in Appendix Five.

D. Local Bus Transit

Loudoun County Transportation Association, Inc. (LCTA) offers a coordinated system of bus transit options to Loudoun residents. In 2001, LCTA initiated transit service on six fixed-routes in Leesburg. A similar fixed-route circulator service is scheduled to begin in the Ashburn area in January 2002, adding 12 routes to the local transit system. LCTA is also considering local transit service for the Sterling area to be served by 10 buses on 20 routes. A planned Route 7 connector service will transport riders between Purcellville, Leesburg, Ashburn, and the Dulles North Transit Center every 30 to 60 minutes during peak hours. Feeder bus service will be an important component in the success of the Dulles Corridor Rapid Transit Project. LCTA serves the Rural and Transition Policy Areas by limited demand-responsive transportation services. In an effort to meet the needs of the County's senior population, the economically disadvantaged, and persons with disabilities, LCTA also offers specialized transportation services to shopping, health care, and other basic needs destinations. Two paratransit vehicles offer rides to County residents with disabilities.

E. Public Transportation Study

In February 2001, the County contracted with a consulting firm to conduct a year-long study of the County's public transportation needs. The County will use information from the study in planning, funding and implementing an efficient and comprehensive public transportation system that will serve the needs of County residents, workers and visitors. The plan will include recommendations for intra-County transit services as well as how to coordinate with other regional systems. A consultant will gather information on commuting habits, attitudes toward public transportation, and unmet transit needs through public meetings and a public opinion survey. The final report from this study will be a public transportation service and facility plan for both the short term (5 years) and intermediate-term (10 years). The County envisions additional studies to examine long-term (20 years) opportunities for transit service in the County through an integrated land use and transportation approach.

Public Transit and Ridesharing Policies

1. The County will direct new development to identified transit corridors and zones that are outlined in the *Revised General Plan* for economic, environmental, social and other reasons that will improve the viability and cost-effectiveness of the future transit services and reduce traffic congestion in the Suburban Policy Area where applicable. The County will encourage design features to improve transit accessibility and efficiency.

2. Loudoun County will plan and implement:

    a. The development of efficient, convenient and environmentally sound local and commuter transit and ridesharing services; and

    b. The development of an efficient all-day bus service serving each of the four suburban communities identified in the *Revised General Plan* and potentially providing interjurisdictional connections to areas such as Herndon and Reston.

3. The Dulles Greenway (Route 267), Routes 7, 28 and 50 (through the Suburban Policy Area) are designated as transit corridors, defined as the transit route and the land area for up to one mile on either side of the route. Land use applications must conform to current land use policies of the Comprehensive Plan in a transit corridor. Transit corridor designations will be updated based on the Countywide Public Transportation Study and additional analysis by staff as part of the Community

Plan process in the Suburban Policy Area. Approvals of land use applications in these corridors will be in conformance with an integrated land use/transportation element that has established the density, use mix, and design for a corridor.

4. The County may permit interim development in transit corridors at densities lower than those needed to support viable services. This will be limited to situations where there will be a tradeoff benefit (e.g., ongoing revenue stream to subsidize the service, analogous infusion of capital/in kind contribution, or combination) associated with the development, which promotes the viability of intended transit services. The County discourages proposed ultimate development in these corridors at lower densities than those needed to achieve the viability of transit services.

5. The County will consider reducing parking requirements for development near transit nodes once transit becomes available in order to encourage transit usage.

6. The County will strive to establish and maintain transit and ridesharing services that are responsive to changing needs and opportunities.

7. County involvement in transit will be phased based on user demand for transit service. The County will accept responsibility for the control and management of a transit system or membership participation in a regional or inter-county system.

8. The County will provide ongoing technical and limited financial support for all transit and ridesharing programs serving identified needs in the County.

9. County financial assistance for transit and ridesharing programs will be based on the following objectives:

    a. The County will strive to maximize the cost effectiveness of all transit and rideshare programs subsidized by the County.

    b. The County will promote the use of transit and ridesharing services by potential automobile users.

    c. The County will promote the use of transit and ridesharing services by transit dependent individuals through fare assistance, outreach efforts and coordination of services with other transit providers within and adjoining Loudoun County.

    d. The County will strive to equitably distribute financial support for transit and ridesharing services based on population and areas served.

10. The County, through its land use planning and other measures, will facilitate the implementation of rapid-rail service in the Dulles Greenway corridor. This service will connect with Metrorail Service at the West Falls Church station. It will serve Fairfax County locations in the corridor and extend to Loudoun County stations at Dulles Airport, Route 606/Dulles Greenway and Ashburn. The Commonwealth Transportation Board (CTB) plans for this rail service to be implemented by 2010. In the 2004-2009 period, the Loudoun County portion of the Dulles Greenway corridor is planned to be served by expanded express and local bus service including bus rapid transit (BRT).

11. The County supports a future study of extending the Dulles Corridor BRT/Rail project to Leesburg.

12. The County will study the feasibility of implementing light rail or other transit services in the Route 28 corridor area that will connect to the rapid transit service in the Dulles Greenway/Dulles Toll Road corridor. Transit services should be planned to serve employment centers throughout the Route 28 corridor area and not be restricted to the median of the road. In conjunction with the feasibility study, the County will undertake a corridor study to consider land use policies and design guidelines that are

complementary to transit services.

13. The County, in partnership with VDOT, WMATA and/or other appropriate agencies, will ensure that land needed to provide planned transit improvements (e.g., separate rail rights-of-way, dedicated busways, etc.) is obtained or reserved prior to or during the process of reviewing land development applications which affect such land. Land acquisitions and reservations will take into consideration both the near term and ultimate transit system configurations, where applicable.

14. Planning for transit improvements in Loudoun County should incorporate the findings of the Loudoun County Public Transportation Study.

15. The County will conduct a long-range (20-year), integrated multi-modal transportation and land use study that will include the identification of opportunities for transit connections among planned communities, town centers and employment areas and rapid transit service in the Dulles Greenway corridor.

16. The County will develop a package of transit and rideshare options and incentives to reduce vehicle miles traveled by inter-county commuters in cooperation with neighboring jurisdictions and Northern Virginia employers.

F. Park-and-Ride Lots

Park-and-ride lots are important to a multi-modal transportation system. They provide space for commuters to park their cars for the day to either join others in a carpool or to take the commuter bus to employment centers in the region's core. Park-and-ride lots help reduce traffic congestion and pollution and assist the Region in meeting Clean Air Act requirements. Properly located, a park-and-ride lot can also function as a short-term interim use prior to development of a site. A park-and-ride lot next to a future transit stop may reserve land that could later be used for more intense development to help ensure the long-term viability of the transit station. This may be appropriate in Urban Centers proposed in the *Revised General Plan*. Regional park-and-ride lots will not be located in the Transit-Oriented Development.

The County currently operates a system of leased park-and-ride lots. All major lots are served by the commuter bus. The largest lot (approximately 200 spaces) is located near the Route 28/Route 625 intersection. There are two lots in Leesburg located at retail centers and lots located in Purcellville and Hamilton at church sites. Loudoun County has secured state/federal Congestion Mitigation and Air Quality Improvement (CMAQ) funds for the construction of permanent park-and-ride lots in Leesburg and Purcellville. Additional future lots of varying sizes have been proffered by the private sector throughout the County.

In September 2001, VDOT and Loudoun County will open the 750 space Dulles North Transit Center, a regional park-and-ride lot near the Route 606/Greenway interchange. This is the first park-and-ride lot in Loudoun County specifically designed to serve express and local bus riders. Once open, it will replace the lot located at Route 28/Route 625. One of the anticipated benefits of this new regional facility is the stimulation of ridership on the future BRT/Rail system. The facility was financed through federal and state funds and the Loudoun County gasoline tax. Loudoun County Commuter Bus Service will be rerouted and expanded to serve the facility.

The design of park-and-ride lots is to be consistent with the County's goal for a high-quality, pedestrian-friendly, and environmentally-sensitive environment. Located at convenient intersections of arterial and collector roads and near commercial or mixed-use centers, they will be linked to surrounding neighborhoods by sidewalks and bicycle facilities. Adequate lighting will promote the safety of commuters and landscaping will ensure their attractiveness.

Park-and-Ride Lot Policies

1. Park-and ride lots in the towns and the Suburban Policy Area will be located along or at the intersection of arterial or major collector roads, near activity centers such as commercial or mixed-use centers, schools, or other destinations, at transit stops, or in other safe and secure locations that provide convenient access. They should be connected by sidewalks or shared pathways to enable carpoolers and pedestrians to walk to the lot. These park-and-ride lots should receive priority consideration for the installation of bicycle lockers and racks.

2. Park-and-ride lots will be designated to provide convenient and safe bus access either within or adjoining the lot. Boarding locations for all transit and shuttle services at or near park-and-ride lots should be easily locatable. Current schedules and fare information for all such services need to be posted at these locations. All such areas need to be evaluated for seating and weather protection on a case-by-case basis. The relevant provisions of the Americans with Disabilities Act need to be incorporated in lot layout and boarding area design.

3. All publicly owned park-and-ride facilities will be well lighted, equipped with waste receptacles, and call boxes. Where public water is available, all portions of park-and-ride lots will be serviceable by at least one fire hydrant.

4. To encourage patronage and improve the local economy, the County will promote supporting commercial ventures (e.g., newsstands, day care services, food vendors, etc.) within park-and-ride lot locations. Support for uses within lot locations may include the provision of stub utility connections and pad/cart sites, modest levels of short-term parking, and favorable initial lease period terms. The provision of public restrooms at park-and-ride lots will be evaluated on a case-by-case basis.

5. Regional park-and-ride lots will not be located in the Transit Oriented Development (TOD).

Non-Motorized Travel

Increasing awareness of environmental and health issues has enhanced the popularity of walking, bicycling and other non-motorized forms of transportation for recreation, commuting, and shopping. The policies outlined in the *Revised General Plan* can have a significant positive impact on pedestrian and bicycle travel through the encouragement of compact, mixed-use, pedestrian-oriented land uses. The development of a master plan of existing and needed walkways throughout the County will be accomplished in conjunction with bicycle accommodation strategies as part of a Countywide Bicycle and Pedestrian Mobility Master planning effort.

A. Pedestrian Mobility

Pedestrian-friendly communities form the backbone of an efficient multi-modal transportation system. Every trip starts with walking. Walking is an affordable, clean, and healthy form of transportation. The predominant design of the local transportation system's roadways and inter-sections do not accommodate pedestrians. Pedestrian/motor vehicle conflicts, in fact, are a problem across the United States, especially in urbanizing areas. In 1999, more than 5,000 pedestrians were struck and killed by motor vehicles in the United States.[7] Almost two-thirds of those U.S. fatalities occur at night.[8]

[7] U.S. DOT Bureau of Transportation Statistics, Pocket Guide to Transportation, BTS99-06R, December 1999.
[8] Transportation Research Board, National Research Council, Planning and Implementing Pedestrian Facilities in Suburban and Developing Rural Areas, National Cooperative Highway Research Program Report 294A, June 1987.

The following obstacles to pedestrian travel are commonplace:

- Difficulty crossing wide, heavily trafficked arterial and collector streets;
- Lack of sidewalks or other designated walking areas along major roadways;
- Insufficient lighting at intersections and along highways;
- Difficulty crossing certain intersections and interchanges because of the lack of a pedestrian travelway or crossing signal, or because the signal timing does not enable pedestrians sufficient time to cross the streets;
- Sidewalks too close to high-speed traffic, discouraging pedestrian travel because of traffic noise and hazard perception; and
- Drivers' general lack of respect for pedestrians.

Planning for pedestrian mobility cannot be conducted in isolation from other planning elements (i.e., land use and highway design). Rather, planning for the pedestrian must be integrated with the entire process of planning, design, and implementation by both the public and private sectors and effectively advocated within that process. Accommodations made specifically for pedestrians are necessary, including sidewalk networks, safe and convenient intersection designs that accommodate pedestrians, and traffic-calming measures conducive to pedestrian travel.

B. Bicycle Mobility

While Loudoun County is fortunate to have the W&OD Trail and smaller recreational trails systems such as those in Cascades, Countryside, and Ashburn, the County does not have a comprehensive network of trails and sidewalks to make bicycling and walking viable forms of transportation. At a time when transportation officials throughout the US are recognizing the bicycle as a viable transportation mode, rapid development has threatened the County's ability to maintain a safe and convenient transportation system for bicycling. However, the County, through the establishment of its Smart Growth principles and ongoing discussions with the community, has made a commitment to improving bicycle and pedestrian accommodations throughout the County.

Numerous benefits are anticipated from the enhancement of bicycle accommodations and riding. These include:

- Enhanced quality of life for County citizens by providing access, connections, and increased mobility for bicycle travel throughout the county on an extensive network of greenway trails, multi-use pathways along roads, bike lanes, wide curb lanes, shared lanes, paved shoulders, retrofitted intersections, and multi-modal connections.
- Improved mobility by increasing the opportunities for walking and biking to public transportation, employment, and other activity centers.
- A cleaner environment. Increased ridership helps to reduce the dependence on single-occupancy vehicle trips and aids the metropolitan region in meeting its air quality attainment requirements.
- Expansion of the rural economy by providing the opportunity for visitors to experience the County's beauty through biking.

- Preservation of cultural and natural resource corridors for public enjoyment through the designation of greenway trails and interpretive signage.

The County recognizes that one size does not fit all when it comes to the location and design of bicycle accommodations. Different traffic volumes, patterns, and roadway designs introduce unique safety considerations. Design constraints due to topography and available right-of-way also are factors in facility design. Furthermore, the needs of different user groups vary from experienced bicyclists that prefer shared- and wide-curb lanes to the less-experienced adult or child rider who finds bike lanes and off-road trails more conducive to comfortable travel. The complete reliance on an off-road trails system is not possible due to costs and funding constraints and is not necessarily the safest or most desirable option. Within a suburban street setting, faster-moving bicyclists greatly increase their vulnerability at intersections by riding on the sidewalk, because motor vehicle drivers often fail to notice bicyclists in crosswalks when making right- and left-turn movements. Most motor vehicle/bicycle accidents occur at intersections: motorists rear-ending bicyclists is rare. The physical characteristics of the network should take into consideration the various needs of different user groups and provide a blend of facility alternatives specific to Loudoun County's road network, community design, and topography.

Pedestrian and Bicycle Facilities Policies

1. The County will work with VDOT to ensure that bicycle and pedestrian accommodations are addressed as part of each stage of planning, design, and implementation, beginning with the scoping stage of all transportation projects. This full integration will reduce the cost of designing the facilities into a project at later stages of design and engineering and ensure that the needs of bicyclists and pedestrians are met.

2. Particular attention should be given to offering bicycle accommodations on arterial and collector roadways with traffic volumes over 1000 vehicles per day.

3. The County and VDOT will include the provision of bicycle and pedestrian facilities with all secondary road improvement projects and will use secondary road dollars for these facilities.

4. The County and VDOT will retrofit secondary roads for bicycle and pedestrian facilities as part of maintenance and improvement projects such as road widening or repaving.

5. All development proposal site plans will show safe, direct and barrier-free pedestrian and bicycle circulation systems. These systems will address circulation within the development as well as connections to adjacent properties. The *Facilities Standards Manual* and Zoning Ordinance will be revised to provide additional guidance on acceptable bicycle and pedestrian circulation.

6. Sidewalk facilities will be planned where appropriate for developed frontages of arterial, collector, and residential roadways in the Suburban Policy Area as part of the Community Plan process. Pedestrian accommodation should also be considered along roadways in developing areas of the Rural and Transition Policy areas of the County in order to connect subdivisions to one another and to nearby commercial areas.

7. Bicycle and pedestrian accommodations will be established as part of all new road and park-and-ride lot construction and reconstruction projects in the Suburban Policy Area unless one or more of three conditions are met: (1) bicyclists and pedestrians are prohibited along the roadway; (2) the cost of establishing bikeways or walkways would be excessively disproportionate to the need or probable use. (Excessively disproportionate is defined as exceeding 20 percent of the cost of the larger transportation project); and (3) where sparsity of population or other factors indicate an absence of need. Bicycle and pedestrian accommodations will also be constructed in the Transition and Rural Policy Areas as part of

new construction/reconstruction projects outlined in this *Revised Countywide Transportation Plan* and the Countywide Bicycle and Pedestrian Mobility Master Plan.

8. To ensure the safety of bicyclists and motorists, all bicycle facilities will be designed in accordance with nationally accepted design guidelines established by organizations such as American Association of State Highway and Transportation Officials (AASHTO) and Americans with Disabilities Act (ADA).

9. The County will coordinate with each of the towns in further planning the countywide network of multi-use trails and other bicycle and pedestrian accommodations paying close attention to the internal networks planned for each town.

10. Bicycling can be encouraged through the provision of other amenities. Bicycle parking should be provided at commuter transit stops, park-and-ride lots, public buildings, parks, offices, and retail areas. Bike racks and bike lockers will be funded through federal, state and local funding programs. The private sector will be encouraged to provide bicycling amenities such as showers, bike racks and lockers in commercial development.

11. The County will consider priority bicycle routes along roadways to include:

(Note: * denotes those roads identified as highest priority by the Sheriff's Office in 1993.)

a. Rural Policy Area*:* 7, 9,15, 50, 287*, 611, 621, 623, 626, 655 (Whites Ferry Road*), 662, 665, 668, 671, 672, 673, 681, 698, 690*, 704, 719, 722, 728, 731, 734, 743, 748, Dawson Gap Lane.

b. Transition Policy Area*:* 50, 621*, 643, 659.

c. Suburban Policy Area: 7, 50, 606, 607, 620, 621*, 625, 637*, 640, 643, 659, 659 Extended, 772, Atlantic Blvd., Pacific Blvd., Davis Drive, Shaw Road, Rock Hill Road, Algonkian Parkway, Riverside Parkway, Russell Branch Parkway, 645 Extended (Westwind Drive).

d. JLMAs*:* Route 7, 773 (Edwards Ferry Road), River Creek Parkway, Crosstrail Blvd., Sycolin Road, Miller Drive, Kincaid Blvd., Trailview Blvd., Russell Branch Parkway, and other roadways identified in Town plans.

Accommodations for bicyclists along roadways can take various forms, such as separated, multi-use trails along the roadway, bike lanes, wide curb lanes and paved shoulders. Their design depends on numerous design factors such as: traffic volumes, accident statistics, number of entrances/exits onto the roadway that could cause conflicts between motor vehicles and bicyclists, curvatures and lines of sight, available right-of-way, presence of historic and natural resources, and distance from existing and planned multi-use trails and probability of use by less experienced riders.

12. Priority trails include:

a. An extension of the W&OD Trail from its present terminus in Purcellville to its proposed terminus in Bluemont with a foot path extending from Bluemont to the Appalachian Trail;

b. A 2.4 mile shared-use trail from the western terminus of the W&OD Trail in Purcellville, west to Round Hill through Franklin Park;

c. A 1.1 mile pedestrian walkway and bicycle path along Colonial Highway (Business Route 7) between the Town of Hamilton and the Harmony Intermediate School;

d. A connector between the W&OD Trail in Leesburg and Whites Ferry on the Potomac River (a 4.5 mile connection);

e. The Potomac Heritage Trail (hiking from Fairfax to Harpers Ferry, WV);

f. A linear park and shared-use trail along the former Manassas Gap Railroad right-of-way linked to the W&OD Trail, or incorporated into a trail network as depicted on the Green Infrastructure Map;

g. The development of a shared-use trail from the C&O Canal to the Town of Lovettsville along the Route 287 corridor;

h. The development of a three mile shared-use trail between Algonkian Regional Park and Claude Moore Park serving the northernmost portion of Cascades south to Claude Moore Park and including a bicycle/pedestrian bridge crossing over Route 7;

i. Connections to the W&OD Trail, the Sterling, Dulles, Ashburn and Potomac Communities from Route 28 and Loudoun County Parkway corridors and appropriate developments;

j. Blue Ridge, Catoctin Mountain, Bull Run and Short Hill shared use trails;

k. Pedestrian and shared-use trails along other creeks;

l. A multi-use trail along the Berlin Turnpike through the Town of Lovettsville and connecting the W&OD and C&O trails;

m. Networks of sidewalks and multi-use trails in each of the Towns.

13. Grade-separated crossings of the W&OD Trail are required for all roadway improvement projects at no cost to the Northern Virginia Regional Park Authority.

14. Within 12 months of the adoption of the *Revised Countywide Transportation Plan*, the County will complete a comprehensive Countywide Bicycle and Pedestrian Mobility Master Plan that identifies an existing and planned network of greenway and multi-use trails, on-road bike lanes, wide-curb lanes, paved shoulders, retrofitted intersections, pedestrian and bicycle over- and underpasses, and where appropriate, equestrian trails, and side paths. These facilities will be planned for both existing and new neighborhoods as part of the Community Plan process and for each of the County's geographic policy areas.

15. Multi-use trails will be planned and constructed in accordance with the Green Infrastructure policies of the *Revised General Plan*, the *Revised Countywide Transportation Plan*, and the Countywide Bicycle and Pedestrian Mobility Master Plan and coordinated with the trail plans of the towns.

16. Development proposals will be in conformance with the Countywide Bicycle and Pedestrian Mobility Master Plan and include provisions for bicycle and pedestrian accessibility within the development as well as connections with adjacent developments as called for in the Master Plan.

17. The County will consider the formation of a Citizen Bicycle and Pedestrian Advisory Committee. The committee's task will be to develop recommendations on the location and design of facilities for inclusion in the Countywide Bicycle and Pedestrian Mobility Master Plan and assist in the promotion of bicycle safety education programs and bicycling as a viable alternative to the automobile.

18. The County will further support bicycling by encouraging transit operators to offer bike-on-bus racks and bike-on-rail accommodations.

19. The County Schools will be encouraged to promote bicycle safety and education in conjunction with information programs sponsored by the County Sheriff's Office, the Virginia Department of Motor Vehicles, and a Citizen's Bicycle and Pedestrian Advisory Committee.

Travel Demand Management

Travel Demand Management, or TDM, describes a wide range of actions that are geared toward improving the efficiency of travel demand. The primary purpose of TDM is to reduce the number of vehicles using the road system while providing a wide variety of mobility options to those who wish to travel. Quite simply, TDM programs are designed to maximize the people-moving capability of the transportation system by increasing the number of persons in a vehicle, or by influencing the time of, or need to, travel. TDM programs must rely on incentives or disincentives to make shifts in behavior attractive. The term TDM encompasses both alternatives to driving alone and the techniques that encourage the use of alternative modes. TDM strategies include, but are not limited to carpools, vanpools, shuttles, bicycling, walking, transit service improvements, provision of preferential lanes for carpools and buses, compressed work weeks, flexible schedules, preferential parking for carpoolers, guaranteed ride home programs for those who do not drive alone to work, and financial incentives such as parking cashouts for transit riders.[9]

Travel Demand Management Strategies are required by both the Clean Air Act and TEA-21. The County integrates TDM strategies into its transportation planning efforts for offering commuter bus service, employee outreach programs, and preferential parking at the county office building for carpoolers, for example. The County also works with land developers during the rezoning process to integrate transit mode design features appropriate to the proposed density of the project. TDM strategies by varying densities of residential and non-residential development is presented in Table 2-2, pg. 2-13.

Travel Demand Management Policies

1. The County will require Travel Demand Management strategies for both residential and non-residential development. Staff is charged with developing ordinance language for the equitable and reasonable implementation of this requirement to be duly reviewed and enacted by the Planning Commission and Board of Supervisors. This language will take into consideration types of development and magnitudes of traffic anticipated in determining the candidate strategies and levels of effort required in fulfilling this obligation.

2. The County will encourage existing and new employment and business uses to support alternative travel modes by offering ridesharing and car/vanpooling, minimizing the availability of parking beyond current County requirements, and providing site amenities (e.g., transit shelters and bicycle lockers) as appropriate. Employers should also investigate other incentives (e.g., parking cashout programs and telework policies).

3. The County will reduce parking requirements when a development proposal includes Travel Demand Management (TDM) strategies that can be demonstrated to reduce trip making to and from the development. Such strategies may include, but are not limited to: carpool and vanpool coordination, parking incentive programs, transit subsidies and teleworking programs. Parking reductions in such instances will be commensurate with the demonstrated reduced demand for parking.

4. TDM strategies that are appropriate for varying residential densities and non-residential areas will be developed and applied during the rezoning process and through public/private partnerships as shown in Table 2-2, pg. 2-13.

[9] National Transportation Library, Bureau of Transportation Statistics, Overview of Travel Demand Management Measures: Final Report, January 1994.

5. The County will create and implement a trip-reduction ordinance as an amendment to the Zoning Ordinance as Part of the Countywide Public Transportation Study, and such an ordinance may be applied in the corridors designated for transit in the *Revised Countywide Transportation Plan*.

6. Travel Demand Management strategies, facilities and/or funding may be accepted as associated with development applications. The amounts of the credits in these instances will be determined based on the reduced need for improvements attributable to conservative estimates of reductions in trip making with the implementation of the TDM strategies in question.

7. As a general principle, the funding of Travel Demand Management strategies from the County's trust fund will be applied to projects serving the transportation system within the area that made the contributions. The funds identified for any particular strategy will be expended either when the total amount needed is accumulated, when the amount accumulated is sufficient for an acceptable, partial improvement, or when the amount accumulated can be used to acquire "matching" funds from another source which, when combined, equal the total amount necessary to fulfill the strategy.

Table 2-2: Appropriate Transit, Rideshare, and Travel Demand Management (TDM) Strategies Related to Residential Density

Strategy ↓ Density →	3-7 du/acre	8-15 du/acre	> 15 du/acre	Non residential
Bicycle Path Network	X	X	X	
Bicycle/Transit Facilities (showers)				X
Bike Racks and Lockers	X		X	X
Bus Stops/Shelters	X	X	X	X
Compressed Work Week				X
Contributions Toward the Transit/Rideshare Trust Fund	X	X	X	X
Employee Parking Cashout				X
Flexible Work Hours				X
Guaranteed Ride Home				X
On-Site Rideshare/Transit Information	X	X	X	X
Park and Ride Lots	X	X	X	X
Pedestrian-friendly Design	X	X	X	X
Preferred HOV Parking				X
Purchase of Vans			X	X
Reduced Parking Requirement			X	X
Shuttle Bus Service			X	X
Telecommuting	X	X	X	X
Transit related design elements:				X
Bus Lanes/Busways		X	X	X
Bus Turnaround			X	X
Transit Signal Preemption/Queue-Jumpers	X	X	X	X

Note: In addition to the above table for TDM strategies, the following selections can be used for mixed use developments:

a. Car-ree areas in Town Centers or Urban Centers
b. Mixed land uses with shared parking